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(54) Method and unit for supplying flat articles

(57) A method and unit (6) for supplying articles (7), each defined by a central panel (8) and two lateral wings (9) connected to the panel (8) along respective preformed bend lines (10), whereby the articles (7) are fed continuously from a pickup station (S4) to a supply station (S2); the articles (7) reaching the pickup station (S4) at a given first speed (V2) and in a given first direction (D2); and the articles (7) being supplied, at the supply station (S2), at a given second speed (V1) to respective products (5) traveling through the supply station (S2) at the second speed (V1) and in a given second direction (D1) parallel to the first direction (D2).

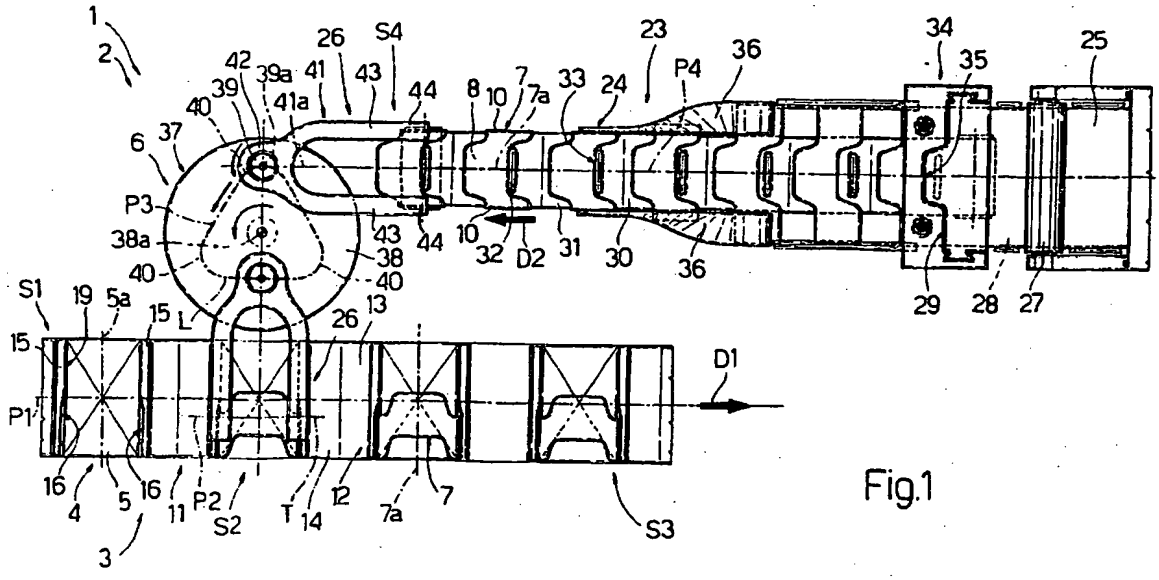

Fig.1

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Descripti n

[0001] The present invention relates to a method of supplying articles.

[0002] In particular, the present invention may be used to advantage for supplying articles, such as labels, strips or collars, to a line for packing products such as cigarettes. In the following description, specific reference is made purely by way of example to supplying a cigarette packing line with collars of the type comprising a central panel, and two lateral wings connected to the central panel along respective preformed bend lines.

[0003] In the tobacco industry, known packing lines form packets of cigarettes by wrapping a group of cigarettes in a respective sheet of wrapping material to form an inner wrapping; placing a collar, of the type described above, on the inner wrapping; and folding a blank about the inner wrapping and the collar. Known packing lines are normally reciprocating types, i.e. in which the elements forming the packets of cigarettes move in steps and the members manipulating the elements move back and forth.

[0004] Reciprocating packing lines are known to employ reciprocating conveyors for supplying the inner wrappings, and collar supply units located along the conveyors and normally comprising a pickup element movable back and forth between a pickup station, where a waiting collar is picked up, and a supply station where the collar is supplied to a respective stationary inner wrapping.

[0005] Supply units of the above type are extremely efficient when operated in reciprocating manner, even at very high speed, but have proved totally unsuitable for continuous packing lines on which the conveyors are assum d to travel continuously and the inner wrappings to be fed through the supply station at a given speed.

[0006] It is an object of the present invention to provide a method of supplying articles, whereby the articles may be supplied to a continuous packing line.

[0007] According to the present invention, there is provided a method of supplying articles to a continuous line conveying products, in such a manner as to assign a respective article to each product, the method comprising the steps of picking up the articles at a pickup station; feeding the articles along a given first path; and supplying the articles to a supply station located along a second path along which said products are fed; the method being characterized by said articles being assigned to the respective products along a given portion of said first path common to said second path; the articles and the products being fed at the same given first speed, at least along said given portion, and in a given first direction.

[0008] The present invention also relates to a unit for supplying articles.

[0009] According to the present invention, there is provided a unit for supplying articles to a continuous line conveying products, in such a manner as to assign a respective article to each product, the unit comprising pickup and conveying means for picking up the articles at a pickup station and feeding the articles along a given first path extending through a supply station located along a second path along which said products are fed; and the unit being characterized by said first and second paths having a common portion at said supply station to enable said pickup and conveying means to assign each article to a respective product traveling, in use, at a given first speed along said common portion and in a given first direction; said pickup and conveying means being provided with actuating means for moving the pickup and conveying means at said given first speed at least along said common portion.

[0010] A non-limiting embodiment of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows a plan view, with parts in section and parts removed for clarity, of a central portion of a continuous cigarette packing line, and a preferred embodiment of the supply unit according to the present invention;

Figure 2 shows a side view, with parts in section and parts removed for clarity, of a detail in Figure 1;

Figure 3 shows a larger-scale view, with parts in section and parts removed for clarity, of a detail in Figure 1;

Figure 4 shows a larger-scale view, with parts in section and parts removed for clarity, of a first preferred embodiment of a detail in Figure 2;

Figure 5 shows a larger-scale view, with parts in section and parts removed for clarity, of a second preferred embodiment of the Figure 4 detail.

[0011] Number 1 in Figure 1 indicates as a whole a central portion of a machine 2 for forming packets of cigarettes (not shown) and comprising a continuous packing line 3 for feeding, at a given traveling speed V1 and along a substantially straight path P1, a succession 4 of substantially parallelepiped products 5, each defining the content of a respective packet of cigarettes, and a supply unit 6 for assigning each product 5 a respective collar 7 having a central panel 8 and two lateral wings 9 connected to panel 8 along respective preformed bend lines 10 parallel to each other and to a central longitudinal axis 7a of collar 7.

[0012] Line 3 comprises a conveyor 11 extending along a path P1 from a loading station S1, where conveyor 11 receives products 5 (in known manner not shown), to an unloading station S3 where (in known manner not shown) conveyor 11 releases products 5 together with respective collars 7. Line 3 also comprises a number of pockets 12 for conveying products 5, and which are equally spaced With a spacing K1 and travel with conveyor 11 at speed V1 in a direction D1 and crosswise to the long longitudinal axes 5a of products 5. Conveyor 11 comprises a conveyor belt 13 looped

about two pulleys (not shown) defining, on belt 13, a conveying branch 14 extending through a supply station S2 located between stations S1 and S3 and where each pocket 12 containing a respective product 5 is assigned, in use, a respective collar 7.

[0013] As shown more clearly in Figure 3, each pocket 12 is substantially U-shaped, and comprises two lateral walls 15, which are crosswise to direction D1, extend from and transversely outwards of belt 13, and comprise respective cavities 16 formed in respective inner lateral surfaces 17 of walls 15 to receive wings 9 of a collar 7. More specifically, belt 13 is defined externally by a flat surface 18 defining, with surfaces 17 of each pocket 12, a seat 19 for receiving a respective product 5, the small lateral surfaces 20 of which are positioned contacting surfaces 17 to close inner cavities 16 and so define, in use, respective housings for wings 9 of respective collar 7. Lateral walls 15 are defined at the top by respective top surfaces 21, which are crosswise to respective surfaces 17 and parallel to surface 18, and are separated from surface 18 by a distance less than that between two large lateral surfaces 22 of product 5 inside respective seat 19.

[0014] Unit 6 supplying collars 7 provides for supplying station S2 with one collar 7 for each pocket 12, collar 7 being oriented with respective axis 7a crosswise to direction D1 and with wings 9 housed inside cavities 16. As shown more clearly in Figure 1, unit 6 comprises a production line 23 for producing a succession 24 of collars from a strip 25 of cardboard, and feeding collars 7 to a pickup station S4. Unit 6 also comprises at least two pickup heads 26 for feeding respective collars 7 along a given path P2 extending through station S4, where heads 26 travel at a given first speed U1 to pick up respective collars 7, and through a release station coincident with station S2, where heads 26 are located over pockets 12 and travel at a given second speed U2, equal to speed V1, to feed respective collars 7 into respective pockets 12, and paths P1 and P2 are superimposed along a common portion T along which path P2 assumes a straight configuration identical to that of path P1.

[0015] Line 23 comprises two powered feed rollers 27 rotating about respective horizontal axes and located one over and substantially contacting the other to engage and feed strip 25 in a given direction D2, substantially parallel to direction D1, along a path P4 extending along a plate 28 parallel to branch 14 and having a shaped end edge 29. Line 23 also comprises a conveyor belt 30, which extends, in line with plate 28, along path P4 to station S4, has a conveying branch 31 at a lower level than plate 28, and comprises a number of transverse projections 32 defining, on belt 30, respective conveying pockets 33 for conveying collars 7 and equally spaced in direction D2 with a spacing K2. Conveyor belt 30 is of a width, measured crosswise to direction D2, substantially equal to the distance between two preformed bend lines 10 of a collar 7, and feeds collars 7 to station S4 at a speed V2 equal to speed U1 of heads 26 and in time with heads 26; and pockets 33 receive respective collars 7 with axes 7a of collars 7 parallel to direction D2.

[0016] Line 23 also comprises a cutting tool 34 of the same shape, in horizontal section, as collar 7, and having, on the side facing plate 28, an edge 35 complementary to edge 29. Tool 34 moves in an alternated manner crosswise to direction D2 and in front of edge 29 to cut a collar 7 off strip 25 by cooperating with plate 28 at each forward stroke, and to feed collar 7 into a respective pocket 33 so that wings 9 project outwards of pocket 33 on either side of belt 30, and so that central panel 8 is positioned contacting conveying branch 31 of belt 30 and is detached from rear projection 32 of respective pocket 33. Line 23 also comprises two helical folding plates 36, which extend along opposite sides of conveying branch 31 of belt 30, and are engaged by wings 9 of each collar 7 to fold wings 9 about respective preformed bend lines 10 and squarely with respect to central panel 8, and to position panel 8 against rear projection 32 of respective pocket 33 by virtue of the friction exerted on wings 9.

[0017] Unit 6 also comprises a known epicyclic transmission 37 connected at the input to a drive motor (not shown) and at the output to, and for moving, heads 26. More specifically, transmission 37 comprises a carousel conveyor 38 rotating about a main axis 38a of rotation of transmission 37 extending crosswise to a plane Z defined by conveying branch 31 of belt 30; and, for each head 26, a respective conveying shaft 39, which is mounted for rotation about a respective axis 39a parallel to axis 38a of conveyor 38, and is movable back and forth along its own axis 39a, as well as cyclically and continuously along an endless path P3 extending about axis 38a and substantially in the form of an equilateral triangle with substantially rounded vertices 40. One of vertices 40 is located at pickup station S4 and is aligned with axes 7a of collars 7 arranged parallel to direction D2, while the other two vertices 40 are located alongside conveying branch 14 of conveyor 11, and are aligned with each other and with direction D1, so that one of the sides L of said equilateral triangle is parallel to direction D1.

[0018] As shown in Figure 4, each pickup head 26 comprises a U-shaped fork 41 having a respective longitudinal axis 41a crosswise to respective axis 39a, and in turn comprising a central body 42 connected to respective shaft 39, and two arms 43 extending from body 42, parallel to each other and to respective axis 41a, and separated from each other by a distance substantially equal to the distance between two preformed bend lines 10 of a collar 7. In respective cross sections, arms 43 are substantially L-shaped, and are defined by respective top portions 44 coplanar with each other and parallel to plane Z, and by respective lateral portions 45 parallel to each other and extending transversely from respective portions 44. Portions 44 and 45 have respec-

tive flat surfaces 46 and 47 facing conveyor 38 and forming respective right angles 48, the vertices of which are separated from each other by a distance equal to the distance between two preformed bend lines 10.

[0019] By means of a known cam device (not shown), each shaft 39 is movable, as stated, parallel to its own axis 39a, between a first raised operating position, in which shaft 39 positions surfaces 46 of respective head 26 at a given distance over plane Z, and a second raised operating position, in which shaft 39 positions surfaces 46 at the same height as plane Z at station S4 (Figure 2). Shaft 39 is also movable through a lowered operating position, in which shaft 39 positions surfaces 46 substantially coplanar with the exposed surface 22 of a product 5 in respective seat 19, and positions lateral portions 45 alongside small lateral surfaces 20 of product 5 to insert wings 9 inside cavities 16 at station S2.

[0020] Each fork 41 has a respective gripping device 49 comprising a number of suction holes 50 formed through surfaces 46 and 47 of respective arms 43, a known pneumatic suction device (not shown) common to all of forks 41, and a number of conduits 51 formed through portions 44 and 45 to connect holes 50 and said suction device. Device 49 also comprises a known distributor (not shown) for activating suction through holes 50, as of station S4, to enable respective head 26 to pick up a respective collar 7, and for deactivating suction at station S2 to enable head 26 to release respective collar 7 onto a conveying pocket 12 containing a respective product 5.

[0021] In actual use, conveyor 11 of continuous packing line 3 feeds products 5, crosswise to respective long longitudinal axes 5a, continuously along path P1 and at speed V1 through station S2. At the same time, line 23 for producing collars 7 feeds collars 7 at speed V2 to station S4, where each collar 7 arrives with wings 9 folded squarely with respect to panel 8, and where each collar 7 is picked up by a respective pickup head 26, is fed along path P2, and is assigned to a respective product 5 along common portion T of paths P1 and P2.

[0022] More specifically, conveyor 38 of epicyclic transmission 37 is rotated continuously (anticlockwise in Figure 1) about axis 38a to feed shafts 39 along path P3, while at the same time rotating shafts 39 about respective axes 39a. The transmission ratio of transmission 37 is such that path P3 is in the form of an equilateral triangle; that, at station S2 and at least along side L of the equilateral triangle parallel to direction D1, arms 43 of each head 26 are maintained crosswise to direction D1 along portion T; and that, at station S4 and at least along the respective vertex 40, arms 43 are positioned parallel to direction D2.

[0023] Moreover, transmission 37 so rotates conveyor 38 and shafts 39 that, as stated, heads 26 travel, at station S4, at a speed U1 directed parallel to direction D2 and equal to speed V2 at which collars 7 are fed to station S4, and travel, at station S2, at a speed U2 equal to speed V1 of products 5 and greater than speed U1, in that speed V1 of products 5 in direction D1 is greater than speed V2 of collars 7 in direction D2. As conveyor 38 feeds each head 26 through station S4 at speed U1, the rotation of conveyor 38 and shaft 39 about respective axes 38a and 39a positions axis 41a of head 26 parallel to direction D2 and therefore parallel to preformed bend lines 10 and axes 7a of collars 7. Moreover, as each head 26 is fed through station S4, shaft 39, previously set to the first raised operating position along path P3 between stations S2 and S4 to lift surfaces 46 to a higher level than plane Z, is set to the second raised operating position the instant axis 41a of head 26 is positioned parallel to and aligned with direction D2, so that surfaces 46 and 47 are positioned respectively contacting central panel 8 and wings 9 of a collar 7, which may be picked up by suction by head 26 and fed along path P2.

[0024] As conveyor 38 feeds each head 26 at speed U2 through station S2, and more specifically along common portion T of paths P1 and P2, the rotation of conveyor 38 and shaft 39 about respective axes 38a and 39a positions axis 41a of head 26 crosswise to direction D1 and therefore parallel to axes 5a of products 5. Moreover, as conveyor 38 feeds each head 26 along portion T, and once head 26 is aligned vertically with a pocket 12, shaft 39 is moved into the lowered operating position to assign respective collar 7 to product 5 inside pocket 12 and insert wings 9 of collar 7 inside cavities 16, and to release collar 7 onto product 5 once the suction through holes 50 is cut off by said distributor.

[0025] In the example embodiment shown, supply unit 6 comprises two pickup heads 26 for alternately picking up and supplying collars 7, but a greater number of heads 26 may be provided, depending substantially on the structural characteristics of continuous packing line 3, or on the type of article to be assigned to product 5 at station S2.

[0026] Figure 5 shows a head 26 comprising a gripping device 52, which is a variation of, and provides for the same functions as, gripping device 49 described above, but which differs by being mechanical as opposed to pneumatic. That is, for each arm 43 of respective fork 41, device 52 comprises a jaw element 53 movable to and from a gripping position in which element 53, in cooperation with respective arm 43 and with the other element 53 and other arm 43, grips a collar 7 on surfaces 46 and 47. Elements 53 are operated by a known control device (not shown) associated with epicyclic transmission 37, and which provides for moving elements 53 to and from the respective gripping positions in such a manner as to prevent elements 53 from interfering with collars 7 during pickup or supply.

[0027] Finally, according to a variation (not shown) of supply unit 6, portion T common to both paths P1 and P2, and along which collars 7 are fed to respective pockets 12 containing respective products 5, may be a substantially single-point portion, in the event paths P1 and P2 of products 5 and collars 7 are tangent to each

other at station S2.

Claims

1. A method of supplying articles to a continuous line (3) conveying products (5), in such a manner as to assign a respective article (7) to each product (5), the method comprising the steps of picking up the articles (7) at a pickup station (S4); feeding the articles (7) along a given first path (P2); and supplying the articles (7) to a supply station (S2) located along a second path (P1) along which said products (5) are fed; the method being characterized by said articles (7) being assigned to the respective products (5) along a given portion (T) of said first path (P2) common to said second path (P1); the articles (7) and the products (5) being fed in a given first direction (D1) and at the same given first speed (V1) at least along said given portion (T).

2. A method as claimed in Claim 1, characterized by comprising the further step of feeding said articles (7) to said pickup station (S4) at a given second speed (V2) and in a given second direction (D2).

3. A method as claimed in Claim 2, characterized in that said articles (7) are fed along said first path (P2) by respective pickup and conveying means (26), each having an axis (39a) of orientation movable along an annular third path (P3).

4. A method as claimed in Claim 3, characterized in that said third path (P3) is substantially triangular-shaped, at least one of the vertices (40) of which is substantially rounded.

5. A method as claimed in Claim 4, characterized in that two of said vertices (40) are aligned with each other and with said first direction (D1).

6. A method as claimed in Claim 4 or 5, characterized in that one substantially rounded said vertex (40) is substantially located at said pickup station (S4).

7. A method as claimed in any one of the foregoing Claims from 2 to 6, characterized in that said first and said second speed (V1, V2) differ from each other.

8. A method as claimed in any one of the foregoing Claims from 2 to 7, characterized in that said first speed (V1) is greater than said second speed (V2).

9. A method as claimed in any one of the foregoing Claims from 2 to 8, characterized in that said first and said second direction (D1, D2) are parallel to each other.

10. A method as claimed in any one of the foregoing Claims from 2 to 9, characterized in that said first path (P2) is an annular path extending about a central axis (38a); said second path (P1) being a substantially straight path.

11. A method as claimed in any one of the foregoing Claims from 2 to 10, characterized in that said articles (7) each comprise a central panel (8), and two lateral wings (9) on opposite sides of the panel (8) and connected to the panel (8) along respective preformed bend lines (10) parallel to each other and to a central longitudinal axis (7a) of the article (7); said articles (7) being fed to said pickup station (S4) with the respective central longitudinal axes (7a) parallel to said given second direction (D2), and being fed to said supply station (S2) with the respective central longitudinal axes (7a) crosswise to said first direction (D1).

12. A unit for supplying articles to a continuous line (3) conveying products (5), in such a manner as to assign a respective article (7) to each product (5), the unit (6) comprising pickup and conveying means (26) for picking up the articles (7) at a pickup station (S4) and feeding the articles (7) along a given first path (P2) extending through a supply station (S2) located along a second path (P1) along which said products (5) are fed; and the unit (6) being characterized by said first and second paths (P2, P1) having a common portion (T) at said supply station (S2) to enable said pickup and conveying means (26) to assign each article (7) to a respective product (5) traveling, in use, at a given first speed (V1) along said common portion (T) and in a given first direction (D1); said pickup and conveying means (26) being provided with actuating means (37) for moving the pickup and conveying means (26) at said given first speed (V1) at least along said common portion (T).

13. A unit as claimed in Claim 12, characterized by comprising supply means (23) for supplying said articles (7) to said pickup station (S4) at a given second speed (V2) and in a given second direction (D2).

14. A unit as claimed in Claim 12 or 13, characterized in that said pickup and conveying means (26) have an axis (39a) of orientation movable along an annular third path (P3) to feed said articles (7) along said first path (P2).

15. A unit as claimed in Claim 14, characterized in that said third path (P3) is substantially triangular-shaped, at least one of the vertices (40) of which is substantially rounded.

16. A unit as claimed in Claim 15, characterized in that two of said vertices (40) are aligned with each other and with said first direction (D1).

17. A unit as claimed in Claim 15 or 16, characterized in that one substantially rounded said vertex (40) is substantially located at said pickup station (S4).

18. A unit as claimed in any one of the foregoing Claims from 12 to 17, characterized in that said first and said second speed (V1, V2) differ from each other.

19. A unit as claimed in any one of the foregoing Claims from 12 to 18, characterized in that said first and said second direction (D1, D2) are parallel to each other.

20. A unit as claimed in any one of the foregoing Claims from 12 to 19, characterized in that said first path (P2) is an annular path extending about a central axis (38a); said second path (P1) being a substantially straight path.

21. A unit as claimed in any one of the foregoing Claims from 12 to 20, characterized in that said pickup band conveying means (26) comprise at least two substantially U-shaped pickup heads (26); and, for each said pickup head (26), a gripping device (49; 52) for picking up and retaining a respective said article (7).

22. A unit as claimed in Claim 21, characterized in that said gripping device (49) is a pneumatic gripping device.

23. A unit as claimed in Claim 21, characterized in that said gripping device (52) is a mechanical gripping device.

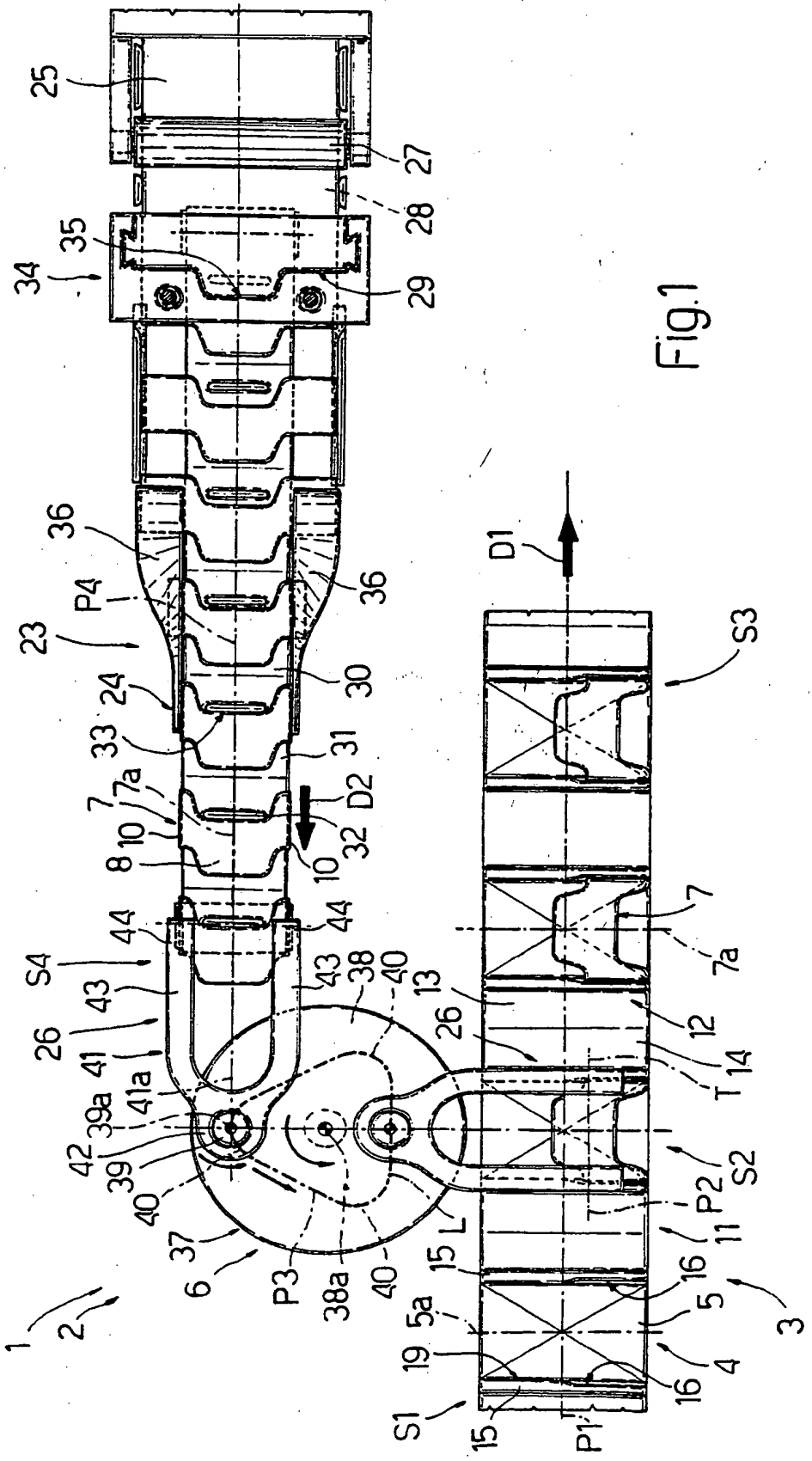

Fig.1

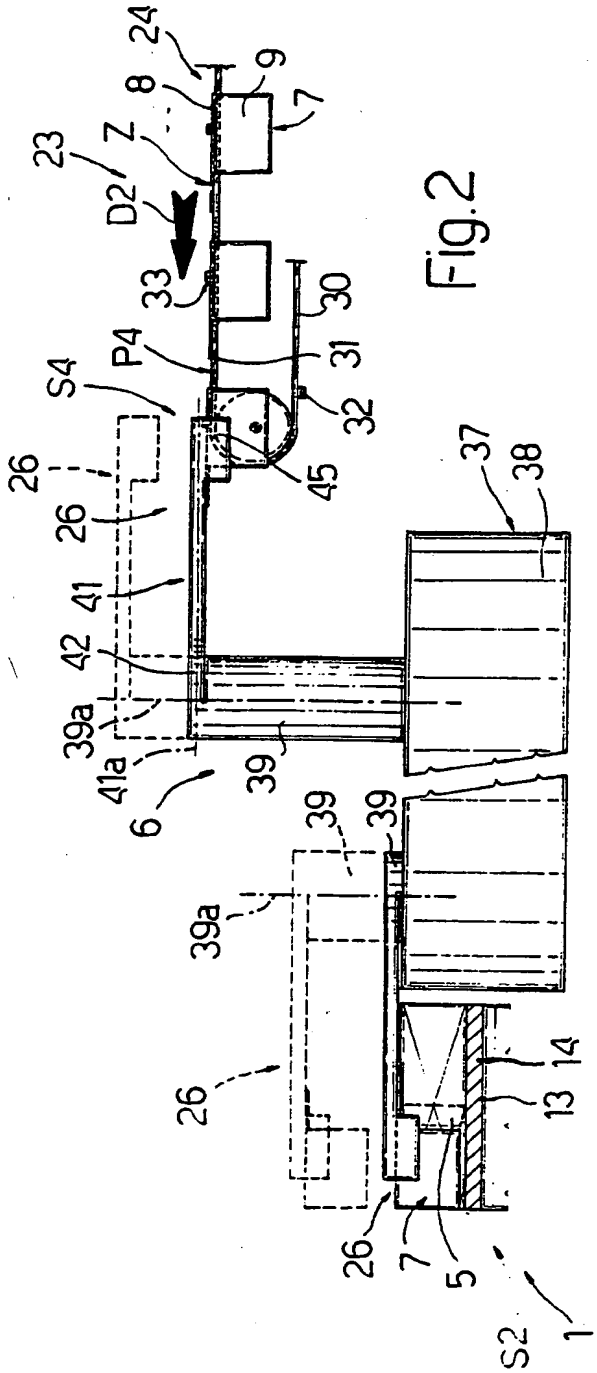

Fig.2

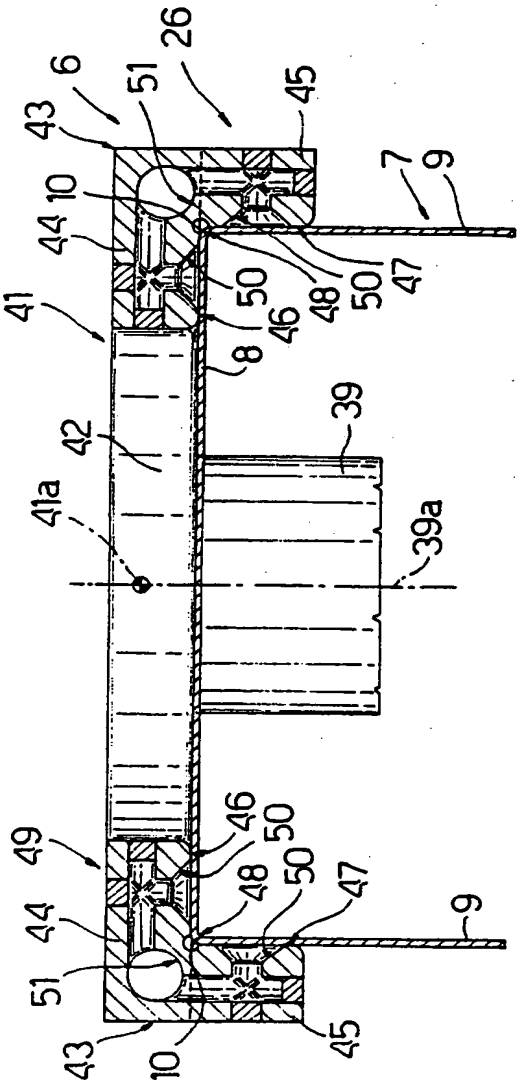

Fig.4

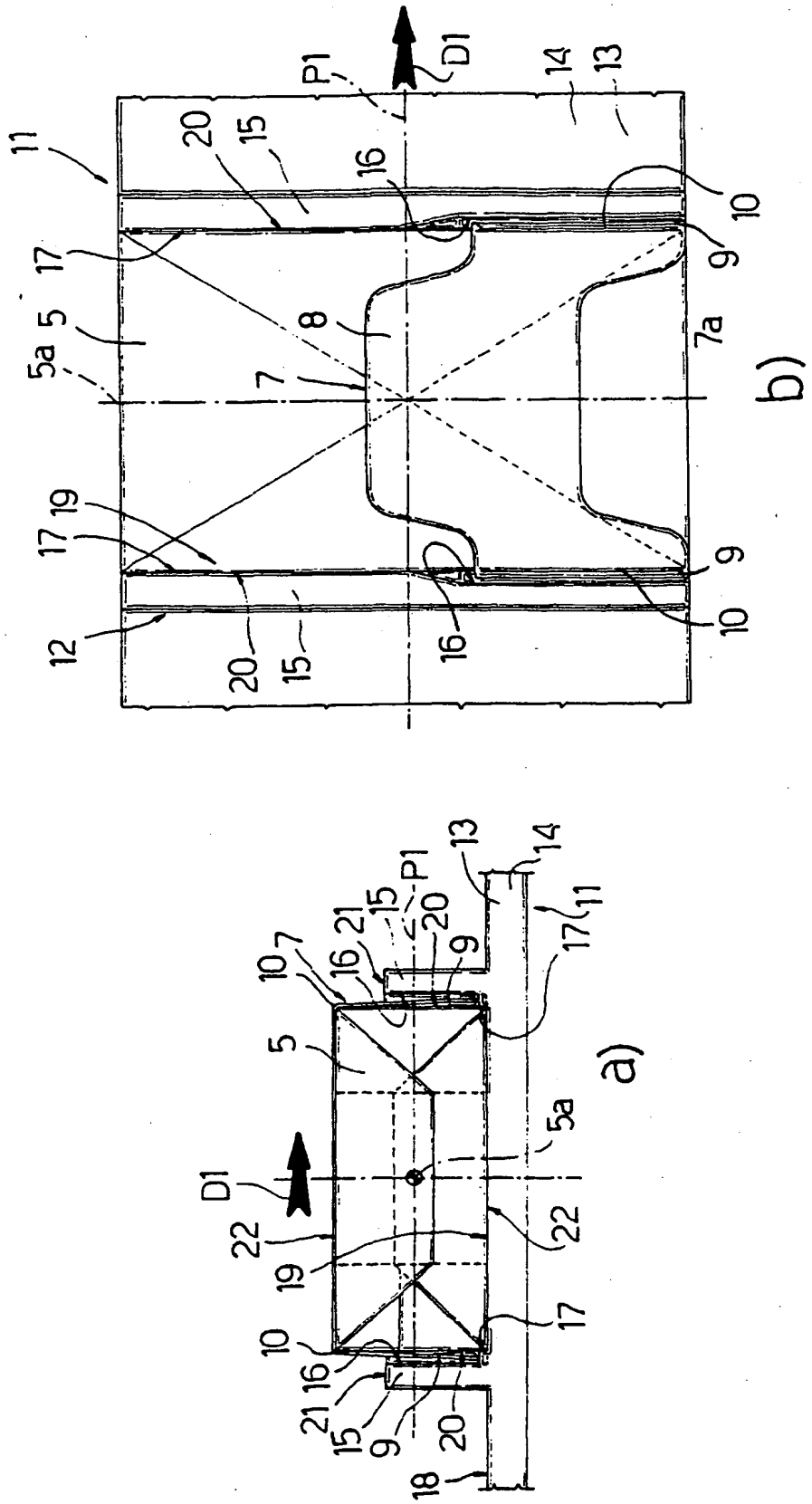

Fig.3

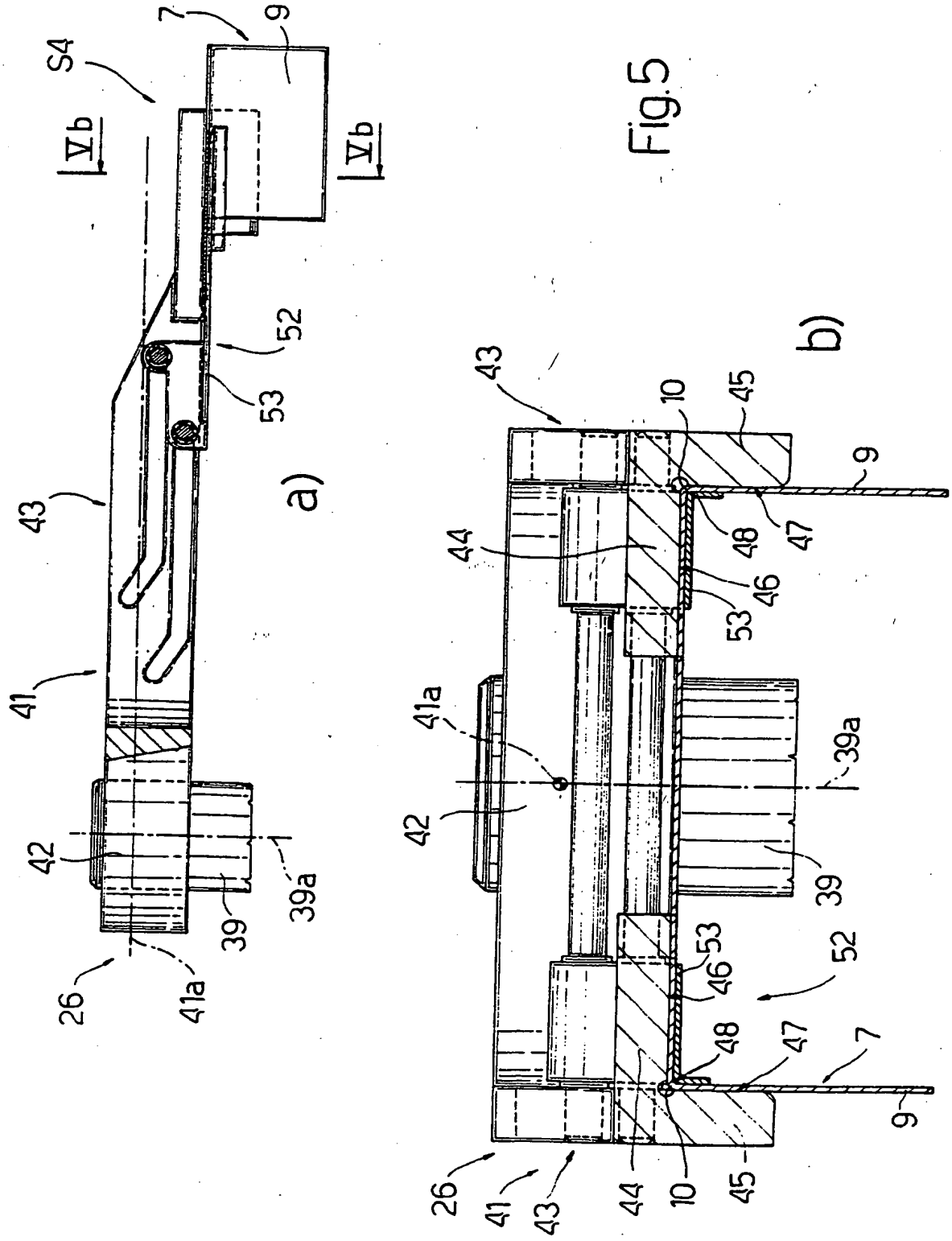

Fig.5

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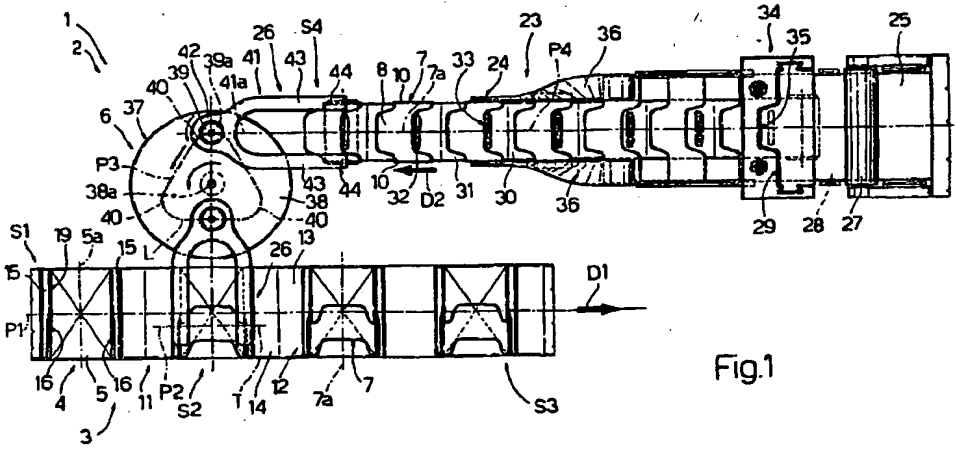

Fig.1

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EUROPEAN SEARCH REPORT

Application Number
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DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	GB 2 063 811 A (MOLINS) 10 June 1981 * page 1, line 110 - page 2, line 14; figure 3 *	1,12	B65B19/22
A	GB 2 238 770 A (G.D) 12 June 1991 * page 5, line 7 - page 6, line 7 * * page 9, line 5 - page 10, line 8; figures 1-3 *	1,12	
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	21 May 1999	Claeys, H

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